

REMARKS

Claims 1, 2, 5 through 7 and 10 are pending in this Application. Claims 1, 2, 6 and 7 have been amended and claims 3, 4, 8 and 9 cancelled. Care has been exercised to avoid the introduction of new matter. Adequate descriptive support for the present Amendment should be apparent throughout the originally filed disclosure noting, for example, that limitations from dependent claims have been incorporated into independent claims. Applicant submits that the present Amendment does not generate any new matter issue.

Claims 1 through 10 were rejected under 35 U.S.C. § 103 for obviousness predicated upon the acknowledged prior art in view of Mazed.

In the statement of the rejection the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the acknowledged prior art by including tantalum oxide and aluminum oxide as a coating. This rejection is traversed.

Applicants submit that there are substantial differences between the claimed semiconductor optical integrated device on the one hand and the acknowledged prior art and Mazed's device on the other hand that undermine the obviousness conclusion under 35 U.S.C. § 103. This is because even if the acknowledged prior art is modified as proposed by the Examiner in view of Mazed, and Applicants do not agree that the requisite fact-based motivation has been established, the claimed invention would not result. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

Firstly, what Applicant has acknowledged as prior art is an anti-reflecting (AR) film coated onto a semiconductor surface. The AR film comprises a first dielectric with a relatively low-refractive index and the second dielectric with a relatively high refractive index. The

arrangement of semiconductor/low refractive index dielectric/high refractive dielectric such that the nearly zero reflectivity wavelength band becomes smaller than that obtained by a configuration of semiconductor surface/high refractive index dielectric/low refractive index dielectric, which is conventional. To seize upon this acknowledged prior art and arrive at the claimed invention is quite a leap.

This is because the acknowledged prior art wherein the wider nearly zero wavelength band, where the high refractive index dielectric is in contact with the semiconductor body, has a **fatal disadvantage** recognized by Applicant. This disadvantage is that the formation of the high dielectric index dielectric is carried out by ion-beam assisted EB evaporation as disclosed by Mazed. Such a formation technique **damages** the surface of the semiconductor. **This problem was first recognized by Applicant and stems from the use of the high energy ion beam, the acceleration voltage and the current due to the ions.** At this point Applicants would stress that the **recognition of a problem** not even a blip on the radar screen of the prior art is, in itself, evidence of **nonobviousness** not obviousness. *In re Sponnoble*, 405 F.2d 578, 160 USPQ 237 (CCPA 1969).

The present invention, in recognition of this problem discovery, solves that problem by providing a low refractive index dielectric which is first evaporated on the semiconductor body. This is because the low refractive index dielectric is capable of being evaporated with relatively low energy from the ion beams, without damaging the semiconductor body. Subsequently, in accordance with Applicants solution, the high refractive index dielectric is formed on the low refractive index dielectric, **not**, repeat **not**, on the semiconductor body.

This **reversed** arrangement of semiconductor/low refractive index dielectric/high refractive index dielectric may thin the total thickness of the dielectric, and employing a second

layer formed of titanium oxide or tantalum oxide, the thickness thereof can be reduced to only 180 nm (paragraph [0050] and the related table). The refractive index of titanium dioxide is about 2.40 comparable to that of tantalum pentoxide (2.14). Therefore, the thinner total thickness results in lower stress of the AR dielectric at the interface between the semiconductor body and the low refractive index dielectric, thereby preventing degradation of the semiconductor facet due to mechanical stress. These features are neither disclosed nor suggested by the applied prior art. Indeed, Mazed's arrangement of semiconductor/high refractive index dielectric/low refractive index dielectric is necessary for the total thickness of the dielectric to be 256 nm for obtaining a substantial wavelength band of the nearly no-reflectivity, far in excess of that of the present invention and then capable of preventing degradation of the semiconductor facet due to mechanical stress.

Moreover, Applicant submits that the Examiner's reliance upon an application of Mazed is not technologically viable. This is because Mazed discloses a light-emitting device emitting light with $1.55 \mu\text{m}$ wavelength band and providing an AR film on one face thereof. The AR film comprises two layers of Ta_2O_5 and Al_2O_3 formed by ion-beam assisted electron beam (EB) evaporation. Although Mazed does not explicitly disclose the order of depositing these materials, such as which material is closest to the semiconductor body, in paragraph [0122] Mazed discloses that "a multi layer Ta_2O_5 and Al_2O_3 dielectric was deposited . . .". A reading of this evulgation would indicate that Ta_2O_5 is in contact with the semiconductor body, **consistent with conventional practices**. This is how one having ordinary skill in the art would have interpreted Mazed, because **one having ordinary skill in the art is presumed to follow conventional wisdom**. *Ecolochem Inc. v. Southern California Edison, Co.*, 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 227

USPQ 293 (Fed. Cir. 1985). Thus, one having ordinary skill in the art would have interpreted that Mazed as disclosing that the multilayer is formed by depositing Ta_2O_5 as the first deposited layer directly on the semiconductor body, followed by depositing Al_2O_3 on the Ta_2O_5 layer because that arrangement of semiconductor/ Ta_2O_5/Al_2O_3 provides a wider wavelength range, where the nearly zero reflectivity can be obtained, vis-à-vis the arrangement of semiconductor/ Al_2O_3/Ta_2O_5 , due to the difference in the reflective index of the semiconductor, that of Al_2O_3 , and Ta_2O_5 , noting that the refractive index of Ta_2O_5 is greater than that of Al_2O_3 .

Based upon the foregoing, it should be apparent that a *prima facie* basis to deny patentability to the claimed invention has not been established for lack of the requisite realistic motivation in arriving at the present invention wherein the AR film comprises a specific arrangement of the semiconductor/low refractive index dielectric/high refractive index dielectric.

Ecolochem Inc. v. Southern California Edison, Co., supra. Further, even if the applied references are combined as suggested by the Examiner, and Applicant does not agree that the requisite fact-based motivation has been established, the claimed invention would not result.

Uniroyal, Inc. v. Rudkin-Wiley Corp., supra. Moreover, there exists a potent indicium of **nonobviousness** of records stemming from Applicant's **recognition of the problem** addressed and solved by the claimed invention, which is not appreciated by Mazed. *In re Sponnoble, supra.*

Based upon the foregoing Applicants submit that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. § 103. Applicant, therefore, submits that the imposed rejection of claims 1 through 10 under 35 U.S.C. § 103 for obviousness predicated upon the acknowledged prior art in view of Mazed is not factually or legally viable and, hence, solicits withdrawal thereof.

Claims 1 through 10 were rejected under 35 U.S.C. § 103 for obviousness predicated upon Yoshida in view of Mazed.

In the statement of the rejection the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the device disclosed by Yoshida by providing a coating of tantalum oxide and aluminum oxide in view of Mazed. This rejection is traversed.

Applicant incorporates herein the relevant arguments with respect to the present invention and Mazed previously presented in traversing the imposed rejection of claims 1 through 10 under 35 U.S.C. § 103 predicated upon the acknowledged prior art in view of Mazed. Applicant would emphasize that the present invention stems from the recognition of the problem of damaging the surface of a semiconductor body using a conventional structure. The present invention addresses and solves that problem by providing a specific structure comprising a semiconductor body/low refractive index dielectric/high refractive index dielectric, thereby avoiding such semiconductor body damage and, further, enabling a reduction in the thickness of the dielectric, thereby preventing degradation of the semiconductor facet due to mechanical stress. No such structure is disclosed or suggested by the applied prior art.

Indeed, as previously pointed out, Mazed neither discloses nor suggests the concept of forming a structure comprising the arrangement of a semiconductor/low refractive index dielectric/high refractive index dielectric. Rather, one having ordinary skill in the art would have understood the disclosure of Mazed as forming the arrangement of a semiconductor/high refractive index dielectric/low refractive index dielectric, based upon the sequence of the multi-layer of Ta_2O_5 and Al_2O_3 , consistent with conventional practices. *Ecolochem Inc. v. Southern California Edison, Co., supra; Standard Oil Co. v. American Cyanamid Co., supra*. The

reference to Yoshida fails to disclose any particular materials or cure the previously argued deficiency of Mazed.

Therefore, even if the applied references are combined as proposed by the Examiner, and Applicant does not agree that the requisite fact-based motivation has been established, the claimed invention would not result. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, *supra*. Moreover, based upon the evidence of **nonobviousness** stemming from Applicant's recognition of the problem attendant upon conventional structures, and unappreciated by Mazed, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed subject matter **as a whole** obvious within the meaning of 35 U.S.C. § 103. *In re Sponnoble*, *supra*.

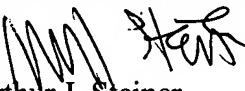
Applicant, therefore, submits that the imposed rejection of claims 1 through 10 under 35 U.S.C. § 103 for obviousness predicated upon Yoshida in view of Mazed is not factually or legally viable and, hence, solicits withdrawal thereof.

Based upon the foregoing it should be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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